The overall wastewater treatment process is complex, and each step is integral to ensuring water is properly purified. Effluent ends up in the plants, containing substances that must be removed before the water can be properly cleaned and returned for use. The range of potential contaminants is almost endless, and can include food, pulp, waste, or other substances. Afterwards, the water requires further scrubbing, with the aid of bacteria. It is in this part of the process that compressed air (ideally provided by energy-efficient rotary lobe blowers) plays a vital role.

Blower air is an indispensable part of biological wastewater treatment plant (WWTP) processes. Integration — on the blower package level as well as the system level — is key to maximizing energy efficiency and ensuring that this critical service is readily available for the communities the WWTP serves.

Defining the Demands of a Wastewater Treatment Plant

Wastewater treatment plants mirror the biological self-cleaning process occurring in natural waters — albeit faster than Mother Nature. Bacteria are added to the wastewater at the start of the process in order to speed up clarification. These microscopic assistants take care of the cleaning work, but need oxygen to thrive and survive. Without air, there is no life, and in the end, no clean water. Oxygenation in wastewater plants is carried out by injecting streams of fine air bubbles through the water. The best approach to oxygenation is to employ the tried-and-true method of using compressed air generated by rotary blowers, because this application normally requires a gauge pressure of only approximately 500 mbar (7.25 psi).

Rotary lobe blowers are positive displacement machines and displace air rather than compress it. As a result, the pressure generated is no higher than actually needed. In other words, there is no over-compression or generation of unnecessarily high pressure. After all, greater pressure means greater costs. Since energy is the single highest operating cost in a wastewater treatment plant — with the energy to operate blowers for aeration being the largest energy consumer — it pays to be efficient.

FIGURE 1: Reliability and efficiency are chief concerns for wastewater treatment plants.